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RESEARCH ARTICLE

Assessment of Community Participation in the Co-Management of Abasumba Globally Significant Biodiversity Area (GSBA), Ghana

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Abstract

Despite the global rise in protected areas and their role in biodiversity conservation, significant gaps exist in evaluating their management. Forest reserves are vital for ecosystem services, human well-being, and contribute culturally, socially, and economically to local communities. Yet, they face challenges in management that require a new assessment approach. However, factors viz. forest degradation from agriculture, settlement, resource extraction, and conflicts with fringe communities, thwart conservation efforts. Hitherto, forests were solely managed by the state with little community participation. Recently, there has been a shift towards involving local communities. This study focused on the role of fringe communities and the Community Biodiversity Advisory Group in the co-management of the Abasumba Forest Reserve in Ghana. It assessed participation in planning, implementation, benefit-sharing, and monitoring, as well as the socio-economic impact of the establishment of Abasumba on community livelihoods. Qualitative data was gathered through focus group discussions with CBAG members, opinion leaders, and fringe community members, while quantitative data via a survey of 120 households from four fringe communities. Findings reveal that community participation through CBAG was minimal at 22.5%, with a higher participation index of 0.3 in monitoring and evaluation activities. The benefits accrued to communities include employment, building materials, firewood, medicinal plants, and non-timber products. The study highlighted the need for government intervention to enhance community involvement by developing useful schemes viz. micro-credit facilities, alternative livelihood opportunities, and entrepreneurial training in non-timber forest products. These could allay rural-urban drift and improve livelihoods, thereby strengthening conservation efforts.

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Keywords
Abasumba, Forest Reserve, Fringe Communities, Co-Management, Participation Index

Introduction

Globally, the number of protected areas has increased significantly over the last decade, in response to the rising need for biodiversity conservation, human welfare, poverty alleviation, and the achievement of SDG goal 15 (Visconti et al., 2019). The World Database on Protected Areas (WDPA) identifies 130,709 protected areas covering over 24 million km^2, more than 12% of the Earth's land surface (UNEP-WCMC and IUCN 2024). These areas serve as reserves to conserve biodiversity and limit the effects of unsustainable use, however managing these reserves properly has become a challenge (Houghton, Nassikas, 2018). Management approaches like the 'top-down approach' denied fringe communities access to formal land use and other forest products (Andriyana, Hogl, 2019; Bayala et al., 2024). Consequently, management programs, policies, zoning strategies, and other conservation initiatives have received little support from fringe communities (Gurran et al., 2015). Now to ensure sustainable development, forest management in most developing countries has shifted to approaches that are more democratic involving diverse stakeholders in the formulation and implementation of management schemes (Adhikari, Baral, 2018). This scheme is widely known as a participatory or collaborative approach which relies on the assumption that the involvement of stakeholders will empower, provide equity, increase their trust in managers, as well as accept and carry out management decisions (Begg, 2018; Boukherroub et al., 2018). In Ghana, to ensure sustainable forest resources management, the demarcation of forest ecosystems into major management schemes viz. (protection, production, selection, and conversion), based on the resources available and the entity managing the area being recognized. These protection regimes were normally under hill sanctuaries, swamps, shelterbelts, or fire protection areas (Nunoo, 2010). The areas occupied c. 352,500 ha, of which 69% is inaccessible for logging, 15% is well stocked, and 127,200 ha, 8% account for areas under conversion (Ankomah et al., 2020). Additionally, for effective *flora* and *fauna* management, areas of biodiversity hotspots were reserved as Globally Significant Biodiversity Areas (GSBAs). Abasumba is among five forest reserves in the Southern Dry Forests (SDF) including Ahirasu I & II, Akrabong, and Obotumfo that were found to harbor biological resources of special global significance. This led to the inclusion of 30 Globally Significant Biodiversity Areas established in Ghana in 1999 (Somuah, 2018). Designation as GSBA is equivalent to the International Union for the Conservation of Nature (IUCN) Category IV designation as a protected area mainly for the conservation of habitats and species through management interventions (Dudley, 2008). Abasumba GSBA, is one of the outstanding remains of the Awutu Forest, an important area for biodiversity conservation and home for rare forest-based species (Hall, Swaine, 1981; Hawthorne, Abu-Juam, 1995). Socio-culturally Abasumba GSBA is sig-

nificant, the name in Ghana means the "children of a god". It is believed that these "children" take the form of a group of four rock boulders, three of which were arranged like a tripod stand locally called "mukyia" with a large one lying on top creating a cave underneath (High Forest Biodiversity Conservation Project of the Forest Services Division (HFBCP of FSD) Management plan 2006). Fringe communities of Abasumba viz. Kwabena Akufu, Obomase No.2, Kwesi Kuma, and Obonase were drafted into a co-management regime with the Resource Management Support Centre (RMSC) of the Forest Services Division (FSD) of the Forestry Commission (FC) of Ghana. The co-management committee was designated Community Biodiversity Advisory Group (CBAG) in Forest Resource Management, with members being individuals that were elected by the Chiefs or opinion leaders and members from the fringe communities (Adusei, Dunyah, 2016; Blomley, Ramadhani, 2006). CBAGs are local collaborators in the maintenance of the biodiversity of the Abasumba, GSBA, with the responsibility of monitoring illegal activities, encroachment, and periodic weeding of the fire belt surrounding the Abasumba, GSBA (HFBCP of FSD Management plan 2006). Co-management is a situation in which two or more social partners and the state negotiate, define, and guarantee amongst themselves, an equitable sharing of management functions, entitlements, and responsibilities for a given territory or set of natural resources i.e., forest resources, pastures, watersheds, etc. (Islam et al., 2018). Although the stakeholders may hold different interests and views, the fundamental assumption is that sharing authority in decision-making will enhance the process of resource management, making it more responsive to a range of needs (Donkersloot et al., 2020). Effective management of resources will occur when local resource users have shared responsibility in decision-making about the resource and the benefits derived from the resource used (Cox et al., 2010). Currently, co-management regimes exist in the montane forests of Kilum and Ijim-Cameroon (Foncha, Ewule, 2020), Senegal Valley forests (Koopman, 2012), Nigeria Gashaka Gumti National Park (Nneji et al., 2019), Niger Gusselbodi forest (Kerkhof, 1989), Burkina Faso Toumousseni forest (Traoré et al., 2012), and the Tanzania Duru–Haitemba and Mgori Miombo forests (Mrema, 2017) where there are supporting legislations. Fringe communities have defined roles in the management of these forest reserves, while in some situations the communities assume full responsibility, as is in the case of the Tanzania Miombo woodlands, where the fringing communities are owner-managers (Ball, 2011; Moses, 2017). Forests that hitherto were degraded have been restored by fringe communities through replanting of native tree species viz. Gshaka Gumti Park, Ela woodlands, and the Magori Mimbo forests in Nigeria, Sudan, and Tanzania, respectively because they were co-managed (Elliott, 2018; Jinga, Ashley, 2019). Conversely, communities engaged in co-management derive benefits such as firewood, thatch grass, construction poles, bamboo, medicinal plants, wild fruits and nuts, edible caterpillars, broom grass, honey, wild mushrooms, and wood from the forest reserves (Agustino et al., 2011; Gurung, 2017). The sale of some of these products is an important economic activity for harvesters living close to such co-managed forest reserves (Bennett, 2010; Egoh et al., 2012). Forests play a vital ecological role in fire protection,

carbon sequestration, soil development, water and nutrient cycling, and biodiversity maintenance (Steel et al., 2024). Additionally, forest reserves provide ecosystem services such as the provisioning services: thus the provision of raw products from forest ecosystems such as food, fresh water, wood, fiber, genetic and medicinal resources; Regulation services: thus the regulation of ecosystem processes such as local climate regulation, air quality regulation, carbon sequestration and storage, noise reduction, run-off water mitigation, moderation of extreme events, waste-water treatment, erosion prevention and maintenance of soil fertility, and pollination; Habitat or support services: thus the provision of habitat and living spaces for species, maintenance of biodiversity, habitat for migratory species and to maintain the viability of gene-pools; and cultural services: these are the non-material benefits obtained from human contact with ecosystems recreation and mental and physical health, tourism, esthetic appreciation and inspiration, spiritual enrichment and sense of place, and intellectual development (Ambe, Onnoghen, 2019; Hansen et al., 2015; Sing et al., 2015). Regrettably, after several years of demarcation of Abasumba and other GSBAs as reserves under Community Biodiversity Advisory Group management no other previous study exists on the management scheme apart from Tano-Offin Forest Reserve, GSBA (Ankomah et al., 2020). Therefore, there is a need to understand developments in the various forest management regimes (protection, production, GSBA, etc.) across the various ecological zones to tailor appropriate strategies to improve the management regimes to ensure sustainable forest management and environmental sustainability for ecosystem services. This study aims to investigate the levels of fringe community engagement in the management and conservation of the biodiversity of the Abasumba, GSBA through the CBAG. Specifically, it aims to (i) assess the roles and levels of participation of fringe communities and members of CBAG in the process of planning, implementation, monitoring, and sharing of benefits as well as (ii) evaluate the socio-economic benefits derived from the creation of Abasumba, GSBA which is aimed at maintaining it to provide information and lessons that can be replicated to enhance sustainable co-management of other GSBAs in Ghana. It is hoped that when the current study is completed, the progress made, and challenges faced in co-management will be made available to serve as guidelines for the improvement in the management of the Abasumba. Lessons learned could be replicated to enhance the successful co-management of other GSBA's and in the end, improve the ecotourism potential and the economic well-being of the fringe communities.

Materials and Method

Study area

The study was conducted in the four closest fringe communities of Abasumba, GSBA (Kwabena Akufu, Obomase No. 2, Kwesi Kuma, and Obonase) in the Awutu Senya West District of the Central Region, Ghana. The district is situated between latitudes

5°20'N and 5°42'N and longitudes 0°25'W and 0°37'W in the eastern part of the Central Region of Ghana and with an estimated population size of 161,460 accounting for 5.6% of the population of the Central Region. About 48.4% (78, 219) of the population is male while 51.6% (83,241) is female (Ghana Statistical Service, 2021). The main economic activity in the district is agriculture (peasant farming and fishing) and agro-processing with most of the inhabitants heavily dependent on forest resources for their livelihood Table 1. The leading food crops grown in the district include cassava, plantain, cocoyam, and pineapple. On average, these communities are located 1.5 km from the reserve boundary. The study area is located at approximately Latitudes 5°37'37" and 5° 38' 38" N and Longitudes 0° 31'32" and 0° 32' 33" W with detailed locations of the fringing communities as shown (Fig. 1). Abasumba covers an area of about 1.5 km^2 and it is located between the Winneba-Somanya Forest Districts of the Central and the Eastern Regions of Ghana (Kabutey, Wodah, 2023). The Abasumba, GSBA is bounded by cassava, plantain, and maize farms. The Abasumba was first demarcated and gazetteed as a forest reserve as far as 1920, however in 1999 it was re-classified as a Globally Significant Biodiversity Area which is currently managed as part of the forest and wildlife reserve network. This was in response to Ghana's commitment to biodiversity conservation after ratifying the Convention on Biological Diversity (CBD) (Derkyi et al., 2013).

Table 1. Demographic characteristics of the four fringe communities to Abasumba forest reserve

Fringe community	Estimated Population Size	Main Livelihood Activities
Kwabena Akufu	881	Peasant farming
Obomase No. 2	861	Pineapple farming
Kwesi Kuma	739	Peasant farming
Obonse	809	Peasant farming

Data Collection Method

Document Analysis: The document analysis was carried out by reviewing all the available secondary data on Abasumba GSBA viz. project documents from the FC, reports, and research papers. This assisted in identifying the prevailing knowledge gap that needed to be filled through research.

Observation: Field observations were made to appreciate the physical, social, economic, cultural, and environmental conditions of the study area and the overall lifestyle of the people. During the observation, informal interviews were made with CBAG members, experts, and the forest manager. This method also enabled the local people to be aware of the researcher and it was used throughout the study to see if there was a difference between what participants were telling and the field realities.

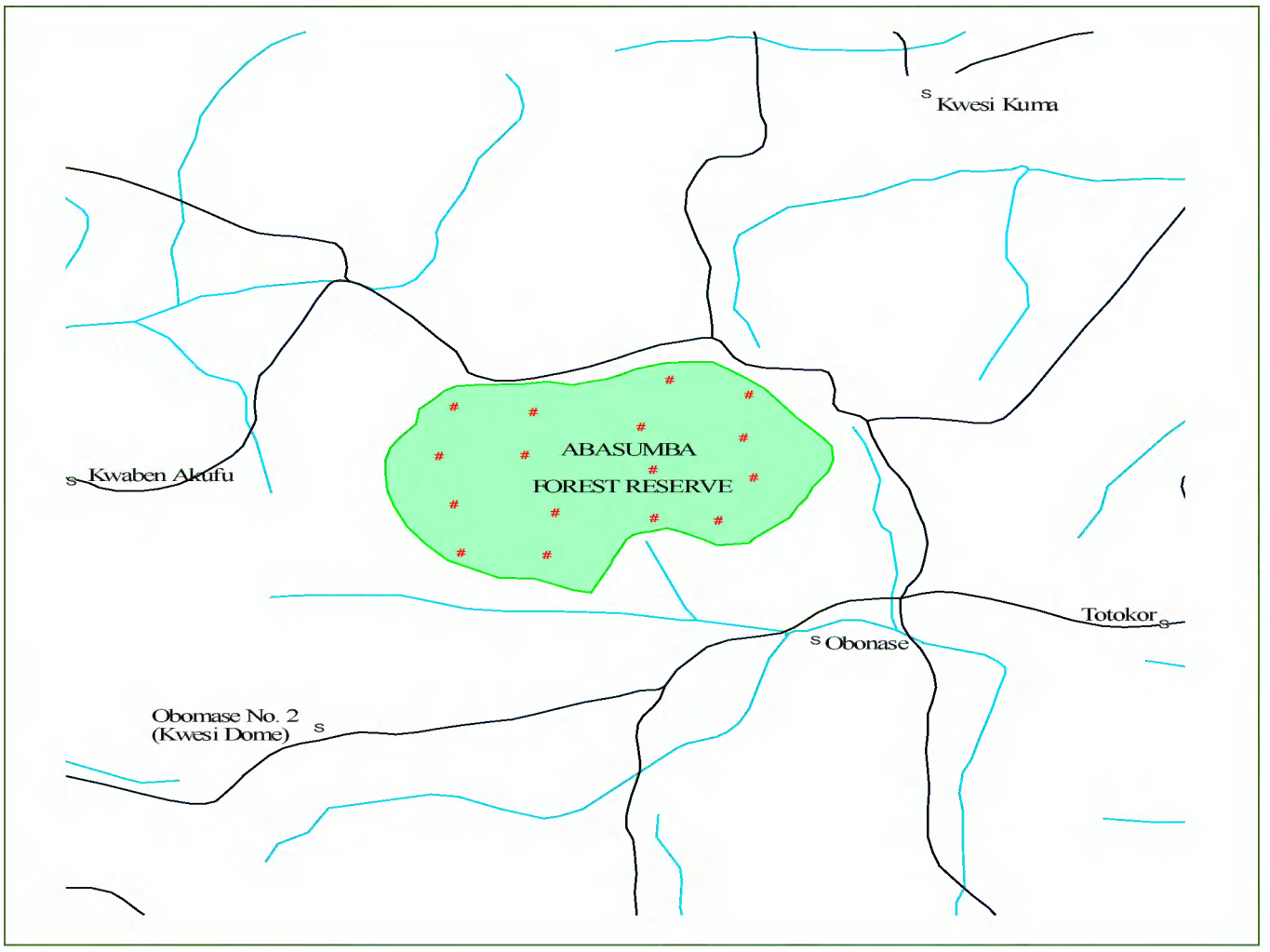

Fig. 1. Subject object – Map of Abasumba GSBA showing fringe communities

Focus Group Discussion: A Focus group discussion was organized to obtain primary information through spontaneous responses from respondents, most of whom have had some level of formal or informal education and therefore could express themselves in English or Twi. The participants included Chiefs of the fringe communities, opinion leaders, knowledgeable individuals, the Zonal Range Officer of Forestry Services Department-Winneba, the Chairman of the CBAG; CBAG members, and members of the fringe communities. The discussions were conducted to elicit the roles played by the fringing communities, CBAG, and the Forest Services Department in the management of the Abasumba GSBA. With the help of the zonal range officer and the Chairman of the CBAG, individuals were purposefully invited to the focus group discussion. The focus group discussion was made up of forty community members including farmers, fishermen, hunters, traders, civil servants, representatives of CBAG, and the Zonal Range Officer. A checklist (Supplementary Material 1) guided the discussions.

Key Informant Interview: Key informant interview was conducted with community elders, assembled men, and experts who were supposed to be knowledgeable about the locality and those who were involved in the formation of the Abasumba GSBA co-managed forest reserve.

Household Survey: The cross-sectional research design was adopted for this study, this allows for a one-time data collection from a given population (Setia, 2016).

This design also enables the generalization of the collected data to the larger population (Babbie, 1990) as well as it makes it easier to examine associations only between variables (Bryman, 2012). In all, 120 respondents (n =120) were sampled for the study; 30 respondents were selected from each of the 4 fringe communities based on 2 criteria adopted and modified (Derkyi et al., 2021). Firstly, the respondents should have lived in the fringe community for at least five years, during which the CBAG was introduced and implemented in Abasumba. Secondly, respondents should be at least 18 and may have experienced or participated in any forest management activity. There was no official record of population figures for the study communities; thus, each community's population figures were estimated by the assembly members of each community (Table 1). Therefore, this study did not depend on those figures to select respondents. Hence, the choice of 30 respondents per fringe community (Table 1) was informed by Bailey (1994), who argued that 30 respondents are the minimum requirement of a sample or sub-sample for a study to which statistical data analysis will be applied irrespective of the population. Thus, 30 respondents per study community were assumed to be satisfactory and representative of the data analysis. The study was also guided by Bryman (2012), who clarified that the choice of a sample size should reflect a balance between limitations imposed by time, cost, and the need for accuracy. An open-ended structured questionnaire (Supplementary Material 2) was employed to gather data using a face-to-face interview with respondents in the fringe communities. Permission was sought from community leaders, household heads, and individuals before data were collected for the study. All ethical considerations were observed during data collection, including a comprehensive and careful explanation of the study objective to the respondents to enable them make an informed decision regarding their participation in this study (Bryman, 2016; Derkyi et al., 2021). Confidentiality of respondents was assured, their views and responses in this study can be withdrawn if they so wish. The questionnaire was developed to collect data on the demographic and socio-economic characteristics of the population such as gender, level of education, employment status, and the role of household members in the management and utilization of the resources in the Abasumba, GSBA. Knowledge of this relationship is useful because socio-economic factors determine the extent to which local people depend on the forest resource for their livelihood (Karupu et al., 2022).

Data Analysis: Data gathered was analysed by using Microsoft Excel and IBM SPSS Statistics version 29 software. Descriptive statistics such as frequencies, percentages, mean, minimum, and maximum were employed for summarizing the data and the results were presented using tables and figures.

Participation index: This study used the participation index (PI) to measure the degree of fringe community members' involvement in the forest resources management stages based on a five-point scale stage (always=1.0, often= 0.8, occasionally= 0.6, rarely= 0.4, and never= 0.2). The values of the index were kept between 0 and 1 for

convenience and easy interpretation. Firstly, the planning, and decision-making process including how the CBAG, and fringe communities are involved in forest decision and planning processes such as management meetings. Secondly, the implementation participation entails how the CBAG and indigenes voluntarily or involuntarily are involved in organization, management, and involvement using their resources (labor, material goods, and information) to manage the forest resources. The third phase of participation in benefits sharing focused on how the CBAG and local people participate in the sharing and distribution of economic or material benefits from the forests i.e., NTFP, etc., and lastly, participation in monitoring focuses on the level of involvement of the CBAG and the fringe communities in patrolling and reporting of illegal activities to the Forestry Authorities. The participation index for the various stages in forest management was calculated using the formulae adopted from (Kamnap, 2003) as cited in (Adams, 2010).

$$\mathbf{PI} = [(\boldsymbol{fa} * \mathbf{1}) + (\boldsymbol{fo} * \mathbf{0.8}) + (\boldsymbol{fc} * \mathbf{0.6}) + (\boldsymbol{fr} * \mathbf{0.4}) + (\boldsymbol{fn} * \mathbf{0.2})]/\mathbf{N}$$

Where: **PI**=Participatory index for forest management stage
fa=frequency of respondents always participating in a particular management stage,
fo=frequency of respondents often participating in a particular management stage,
fc=frequency of respondent occasionally participating in a particular management stage,
fr=frequency of respondents rarely participating in a particular management stage,
fn=frequency of respondents never participating in a particular management stage and
N=Total number of respondents for each stakeholder category.

The value of PI can be interpreted on a scale of (0-1), where zero means the primary stakeholder has no chance of participating and 1 means always participating. An increase in values from (0-1) implies an increase in the participation level of the stakeholder group concerning the specific forest resources management stage.

Results

Focus Group Discussion

Most of the participants 68% of the focus group discussion were not members of the CBAG and were of the view that the membership of the CBAG should be expanded to include more individuals. They also contended that the establishment of fire belts and the fighting of wildfires during the dry season were carried out through communal labor and not by the CBAG members alone. Therefore, any benefit that accrues from the Abasumba GSBA should be shared equally or used for the provision of amenities for the whole community instead of being enjoyed by the CBAG members and their associates. Many of the participants, especially women, felt left out of the management of the Abasumba GSBA. This was supported by the fact that there were few female members in the CBAG. Membership of CBAG was also seen to be a life occupation where people who have been nominated by the Chiefs, the traditional elders, and the community held such positions for their lifetime without being replaced unless the individual

resigned, moved out of the community, engaged in illegal activity in the reserve or died before they are replaced. Rainfall 43.0% and firewood for funerals 32.0% were ranked as the highest benefits individuals and the community derived from the Abasumba, GSBA. Plants for medicinal purposes and logistics 18.0% was the third highest ranked form of all livelihoods derived from the Abasumba, GSBA. It was observed that instead of using these herbs to treat themselves, most respondents ended up in public hospitals to seek malaria and fever treatments. A few individuals 7.0% however could not state the livelihood they derive from the Abasumba, GSBA (Table 2).

Table 2. Rankings of Livelihood derived by participants of the focus group discussions from the Abasumba GSBA

Livelihood derived	Number of respondents	%
Rainfall	12	43.0
Firewood for funeral	9	32.0
Medicine and Logistics	5	18.0
Do not know	2	7.0
Total	28	100.0

Source: Field Survey September 2022

Table 3 shows the ranking of the needs of the fringe communities of Abasumba GSBA. Kindergarten 64.3% was ranked as the greatest need of the communities because the very young children could not walk to the nearest communities where there were established schools. They complained of the younger children hampering their work on the farm when they took them along. Community clinics 21.4%, tarred roads 10.7%, and community centers 3.6% respectively followed in that order, of community needs. The communities also believe that governments need to develop more realistic mutually beneficial schemes such as micro-credit facilities, alternative livelihood enterprises, and entrepreneurial skills. To equip indigenes with techniques for cultivating NTFPs and rearing grass cutters, snails, mushrooms, etc. within the fringe communities to curb rural poverty and improve the economic status of members of the communities.

Table 3. Rankings of community need assessment by participants in the focus group discussions

Community needs	Number of respondents	%
Kindergarten	18	64.3
Clinic	6	21.4
Tarred road	3	10.7
Community center	1	3.6
Total	28	100.0

Source: Field Survey September 2022

Questionnaire Survey

Socioeconomic Characteristics of the Respondents

Demographic data of the 120 individuals interviewed in the fringe communities to obtain information on the role of the community members in the management of the Abasumba GSBA is shown in Table 4. Females formed the majority 62.5% of respondents while 37.5% were males, covering a wide range of age groupings. The predominant age group was 31-40 years representing 36.7%, while 11.7% were over 60 years. About 20.0% of respondents lacked formal education, while 56.7% had primary, middle, or secondary education (Junior High School and Senior High School) with 10.8% having received Tertiary education.

Table 4. Socioeconomic characteristics of respondents from the four fringe communities

Socio-demographic variable	Kwabena Akufu	Obomase No.2	Kwesi Kuma	Obonase	%
Gender					
Male	8	13	14	10	37.5
Female	22	17	16	20	62.5
Age (Years)					
21–30	5	6	5	7	19.2
31–40	10	14	12	8	36.7
41–50	7	5	5	5	18.3
51–60	6	1	3	7	14.1
> 60	2	4	5	3	11.7
Educational background					
No formal education	3	6	8	7	20.0
Primary/Middle School	10	7	10	9	30.0
Secondary (JHS/SHS)	8	10	5	9	26.7
Tertiary (University)	5	1	4	3	10.8
Other	4	6	3	2	12.5

Source: Household Survey September 2022

Occupation of respondents

The occupation of the interviewees shows 32.5% of the respondents were peasant farmers, 19.2% self-employed, and 10.8% were unpaid family workers, while the remaining were involved in one or more income-generating activities. A few of the interviewees 2.5% were government employees or in other private employment as shown (Fig. 2).

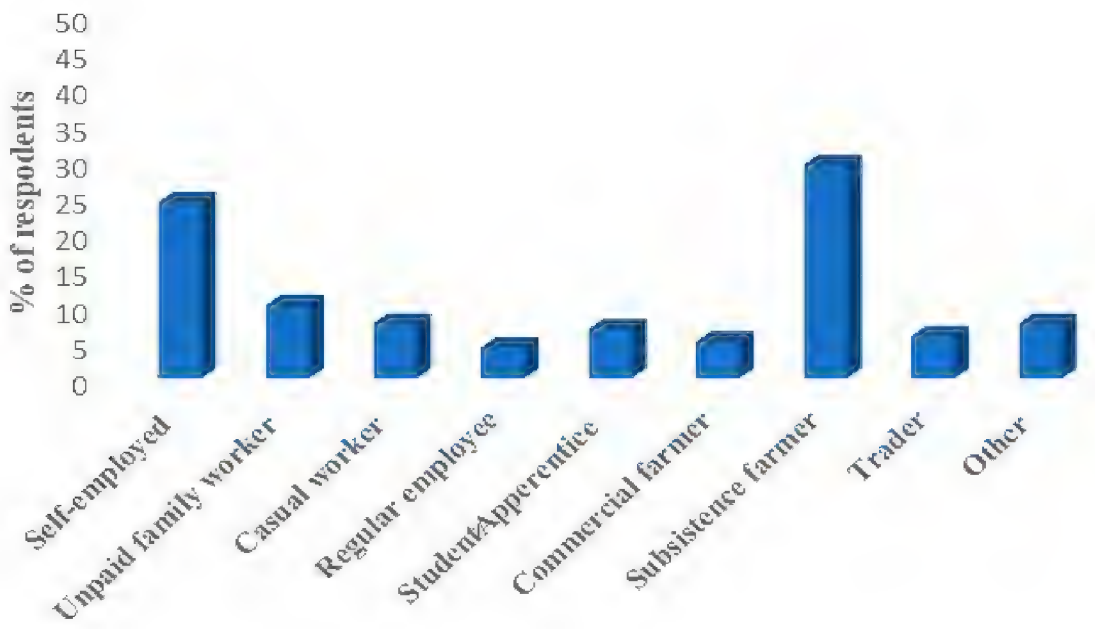

Fig. 2. The occupation of respondents

Ecological and socio-economic effect of the Abasumba GSBA, on Fringe communities

Most of the respondents, 71.7% and 68.3% in the fringe communities of Abasumba, GSBA surveyed, were of the view that the creation of the reserve did not affect their livelihoods as well as their communities, respectively. A large majority of the respondent 84.2% stated that the creation of the Abasumba GSBA had no effect on their work but 60.8% intimated that it had positively impacted their work. Conversely, 28.3% of the interviewees thought the creation of the Abasumba, GSBA influenced their livelihoods, 31.7% on their communities, 15.8% on their work, and 31.2% said it adversely affected their work while 7.5% were indifferent as illustrated in Table 5.

Table 5. Effects of Abasumba establishment on the livelihood of respondent and community

Forest reserve	**On the community**		**On the livelihood**		**Affect your work?**		**Adversely or positively?**		
	No.	%	No.	%	No.	%		No.	%
Yes	38	31.7	34	28.3	19	15.8	Adversely	38	31.7
							Positively	73	60.8
No	82	68.3	86	71.7	101	84.2	I do not know	9	7.5
Total	120	100	120	100	120	100		120	100

Source: Household Survey September 2022

Access to the Abasumba, GSBA

Table 6 shows that access to the Abasumba, GSBA is restricted to the fringe communities. Most of the respondents 77.5% indicated that community members were not allowed to enter the reserves to undertake farming or other commercial activities. To most of the interviewees, the Abasumba is a restricted area, and they require authorization from the District Forestry Officer or the CBAG to enter. However, they emphasized that they were allowed restricted accesses under conditions viz. 84.2% to collect medicinal plants for non-commercial purposes, 73% harvest dead fuel wood for funerals, while 97.5% responded that they were not allowed to cut down trees and 22.5% confirmed they were allowed entry to perform annual rituals. It was observed that although entry is restricted, people enter the reserves illegally. For instance, hunters enter the forest under the cover of darkness on hunting expeditions as bullet cartridges were found on the forest floor. Additionally, there were visible signs of collection of Non-Timber Forest Products (NTFPs) viz. chewing sticks and sponges, building materials, and raffia. With the increasing population of fringe communities, the possibility of unsustainable pressures on NTFP harvest from the reserve was eminent.

Table 6. Responses on whether they have access to the Abasumba, GSBA

Can you enter?			Collect medicinal plants?		Dead fuel wood?		Harvest/Cut trees?		Perform rituals?	
	No.	%	No.	%	No.	%	No.	%	No.	%
Yes	27	22.5	19	15.8	47	39.2	3	2.5	27	22.5
No	93	77.5	101	84.2	73	60.8	117	97.5	93	77.5
Total	120	100	120	100	120	100	120	100	120	100

Source: Household Survey September 2022

Benefits derived by individuals and fringe Communities from Abasumba, GSBA

Table 7 shows the benefits derived by individuals and the communities from the Abasumba, GSBA. The households articulated five main benefits: about 26.7% stated that they derived rainfall, 20.8% derived medicinal plants, 18.3%, got high crop yields, 15.8% said the forest served as a windbreak and 14.2% stated that they derived employment from the forest as individuals. However, 4.2% could not indicate the type of benefit they derived from the Abasumba, GSBA. On the benefits derived by the fringing communities from the Abasumba, GSBA of the 120-respondent 65.0% stated that they got firewood from the Abasumba, GSBA for their funeral ceremonies, 15.0% said they derived employment, 10.0% derived logistics (NTFPs), 3.3% derived materials for building while 6.7% said they did not know the benefits the communities derived from the Abasumba GSBA, respectively.

Table 7. Benefits derived from the Abasumba, GSBA

Individuals	No.	%	Community	No.	%
Rainfall	32	26.7	Firewood for funerals	78	65.0
Windbreak	19	15.8	Employment	18	15.0
High crop yield	22	18.3	Logistics	12	10.0
Employment	17	14.2	Materials for construction	4	3.3
Medicinal plants	25	20.8	I do not know	8	6.7
I do not know	5	4.2			
Total	120	100		120	100

Source: Household Survey September 2022

Role of Community Members and CBAG in the Management of Abasumba, GSBA

A majority, 82.5% of household heads interviewed specified that they did not have any member of their household engaged in the activities of the CBAG while 17.5% have members of their household in the CBAG. Although most of the respondents were not members of the CBAG they indicated that they took part in activities such as clearing the vegetation around the forest reserve to create a fire belt, planting trees to serve as green buffers outside the fire belt and others were engaged in fighting wild-fires during the dry season (Fig. 3).

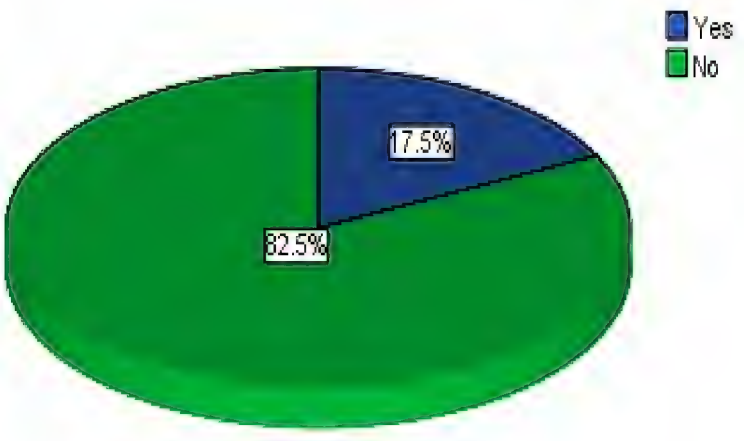

Fig. 3. Percentage of households that had members on CBAG

The members of CBAG detailed that they help in providing information 6.7%, patrolling the Abasumba, GSBA 23.3%, and guarding the forest 26.7% Table 8. Other roles played were to serve as a tour guide to interested parties visiting the Abasumba forest reserve, boundary, and fire belt clearing, enforcing relevant forest protection laws by arresting and ensuring prosecution of offenders. In addition, they carried out biodiversity campaigns in the fringing communities in collaboration with the Resources Management Support Center (RMSC), of the Forestry Commission based in Kumasi.

Table 8. Role of CBAG members in co-management of the Abasumba, GSBA

Role of CBAG members			Reasons adduced for becoming a CBAG member		
Consultation	8	6.7	Source of food	25	20.8
Patrolling of reserve	28	23.3	Medicine	32	26.7
Guard	32	26.7	Materials for construction	6	5.0
Clearing of weeds in fire belt	42	35.0	Other	57	47.5
Planting of trees in the fire belt	7	5.8			
Other	3	2.5			
Total	120	100%		120	100%

Source: Household Survey September 2022

Participation Index of the Management of Abasumba GSBA

The level of fringe communities' participation was measured by computing the overall participation index of some selected activities of the four stages as indicated in Table 9. The participation indices were calculated based on the computation of the frequency of participants' participation in a specific activity to the total number of respondents to know whether they were symbolic or real players in all the activities in the management of Abasumba. The results exhibited varied degrees of participation across the four stages of the project where the implementation and monitoring stages exhibited high (PI=0.3), their role at the benefit-sharing and distribution stage was low (PI=0.2) and while the planning and decision-making stage was the least (PI=0.1).

Table 9. Participation index of the selected activities at the four stages of the Abasumba GSBA

Management Stage	Participation Index
Planning and decision-making	0.1
Implementation	0.3
Sharing and distribution of benefit	0.2
Monitoring	0.3

Source: Household Survey September 2022

Discussion

Most of the members of the fringe communities of Abasumba GSBA were peasant farmers, and they played minimal roles in the management and conservation of the resources in the GSBA. Most of the respondents were of the view that the creation of the Abasumba, GSBA did not affect their work, livelihood, or the community, but few intimated that it has positively impacted their work. The current findings are consist-

ent with (Edusah, 2011) who indicated that the constitution of forest reserves was a good thing and that the forest had a great influence on the climate and ecosystem of fringe communities in Ghana. However, our findings are in contrast to the findings of (Amoah, Wiafe, 2012) who expressed that the inhabitants close to the Kakum National Park in the Central region of Ghana asserted that they have been negatively impacted by the presence of the forest reserve. The Abasumba, GSBA is restricted to the fringe communities and most of the respondents indicated that they were not allowed to undertake farming or other commercial activities in the forest reserve. Nevertheless, restricted entry was allowed for the collection of medicinal plants for non-commercial purposes, harvesting of dead fuel wood for funerals, and performing annual rituals and NTFPs in the reserve. This aligns with (Acheampong et al., 2018; Adusei, Dunyah, 2016) where respondents revealed that NTFP collection was allowed anytime they were available by the fringe communities in the Tani 1 and the Suhuma Forest Reserve in Ghana, respectively. On the benefits derived by individuals and the communities from the Abasumba, GSBA it was listed as rainfall, medicinal plants, high crop yield, building materials, windbreak, employment, firewood for funeral ceremonies, and logistics. This is in tandem with the growing literature on the contribution of forest reserves to the livelihoods of fringe communities (Baddianaah, Baaweh, 2021; Husseini et al., 2020; Yahaya et al., 2021). The engagement of the community members in the implementation and monitoring stage activities was more frequent than the benefit-sharing, planning, and decision-making stages respectively. This project involved the fringe communities in the project implementation activities. For example, the interviews revealed that most of the community members actively participated in the clearing of the vegetation around the forest reserve to create a fire belt and planting of new trees to serve as green buffers outside the fire belt from various seedlings provided. This finding is comparable to that of (Maraga et al., 2011) who reported high community participation in the afforestation project activities viz. tree nursery and woodlot establishment in the River Nyando basin, Kenya but the lack of community participation in the monitoring and evaluation stage led to the failure of the Sal forests area project in Bangladesh (Islam et al., 2015), Additionally, (Husseini et al., 2016) reported that most households did not participate in forest reserve management in the northern region of Ghana because of the lack of invitation to participate in any decision-making processes, and lack of awareness about the benefits of the forest reserve management. In Abasumba the fringe communities were least engaged in the planning and decision-making process which contrasts with (Degeti, 2003) who argued that providing decision-making rights is the key to mobilizing people's participation in natural resource conservation. However, this finding is in line with (Islam et al., 2013) who reported that local people were less involved with forestry project planning in Bangladesh, as the forest department officers had always played the dominant role and controlled the whole decision-making process. According to (Islam et al., 2013) reported in (Tadesse et al., 2017), the greatest challenge to effective participation is usually the forest department officials' decision-making behavior, which tends to inhibit a participatory forest management approach.

Recently, co-management arrangements in Australia, involving the Aboriginal communities, and in Canada have institutional arrangements enlarging the scope for local participation in decision-making over resources, while also respecting indigenous land claims (Addison et al., 2019; Castro, Nielsen, 2001). Within the Miombo woodlands and the Duru-Haitemba Village Forest in Tanzania, the fringing communities have been given complete autonomy over the management of these forest reserves (Wily, 2000; Wily, Dewees, 2001). Experiences from many countries have shown that when communities are empowered with responsibility and legally secured rights for the management of forests and their resources, and receive benefits from them, the rate of degradation is substantially reduced, and in many cases, the forest cover improves visibly (Chirenje et al., 2013; Odera, 2009). In India and Nepal where communities have been encouraged to share custodian functions in managing local forests, degradation has declined and come to a total halt (Campbell, 1996; Poffenberger, 1990). Forest reserves co-management is also emerging as the dominant strategy for conservation and sustainable utilization in Sri Lanka (Ekanayake et al., 2020), Thailand (Salam et al., 2006), China (Yiwen, Kant, 2020), the Philippines (Apipoonyanon et al., 2020), etc. In other parts of Africa, such as Gambia (McWhinney, 2022), Senegal (Borrini et al., 2007), and Cameroon (Kimengsi, Ngu, 2022) the communities are allowed to zone the forest and determine an appropriate management regime to use in management. In contrast, in Burkina Faso, Côte d'Ivoire, and Ghana, the management plan is developed by the forest service's department with inputs from the participating community (Karsenty et al., 2008; Wily, 2002). These regimes of co-management have been in use and have been eased in some countries where procedures have been simplified and decentralized to avoid one stakeholder being marginalized or disadvantaged (Cronkleton et al., 2012).

In Abasumba, many of the household heads interviewed specified that they do not have any member of their household engaged in the activities of the CBAG while a handful had members of their household in the CBAG. Although most of the respondents were not members of the CBAG they indicated that they took part in activities in the sustenance of the biodiversity of the Abasumba, GSBA. The main roles played by members of the fringe communities in the management of the Abasumba GSBA were clearing the vegetation around the Abasumba, GSBA to create fire belt, planting trees as green buffer outside the fire belt, clearing the fire belt when it becomes weedy and fighting of the outbreak of wildfires during the dry season. This contributed to the high participation index exhibited during the implementation and monitoring stages in the establishment of the Abasumba GSBA.

Members of CBAG on the other hand served as tour guides to interested parties visiting the Abasumba, GSBA, providing relevant information on the forest reserve, forest boundary clearing, patrolling, and enforcing the relevant forest protection laws by arresting and ensuring the prosecution of offenders, and providing useful information in the conduct of field surveys. In addition, they act as local facilitators and resource personnel during biodiversity campaigns within the fringe communities in collaboration with the RMSC of the forestry commission based in Kumasi. Major

decisions regarding the formulation and implementation of management plans and other silviculture practices in the Abasumba GSBA are handled by the FC, specifically the Winneba district forest manager, the Zonal Range Officer, and sometimes together with the chairman of CBAG in the fringe communities. Elsewhere, co-management regimes have provided legal recognition for customary lands and rights to some resources, and the political empowerment of local stakeholders or resource management institutions play a major role for local resource users in management and decision-making processes.

Communities engaged in co-management regimes benefit from those forest reserves; the extent of the dispensation of direct benefits derived from such forest reserves through co–management varies between countries. But essentially the benefits generally derived are the same categorized as: wood products i.e. (timber, poles, rafters, withes, fuel wood, etc.), NTFP i.e. (wild mushroom, honey, tannins, dyes, oils, resins, gums, fiber, food, fodder, grass, medicines, chewing sticks, wild fruits, and vegetables, medicinal plants, etc.) and royalties. These benefits are like the kinds of benefits derived by the fringe communities of Abasumba GSBA. Some communities within Ghana and Cameroon, have well-developed socially responsible spending arrangements, where timber-harvesting companies pay a specified percentage of their profits for local area development (Amanor, 1997; Young, Nkuintchua, 2022). Communities fringing protected forestlands are poor, and they think that they are forced to bear substantial costs, including the protection of biodiversity and related forest goods and services, for these fewer benefits. The communities therefore believe that there is a need for Governments to develop more realistic mutually beneficial schemes such as micro-credit facilities, alternative livelihood enterprises, and entrepreneurial skills. To equip indigenes with techniques for cultivating NTFPs and the rearing of grass cutters, snails, mushrooms, etc. within the fringe communities to curb rural poverty and improve the economic status of members of the communities.

Conclusions

In the past, a top-down approach was used in the management of natural resources and their environment, as indicated by the establishment of protected areas without extensive consultation with relevant stakeholders. The initiative of community-based natural resources management, CBAG, as a component of the GSBA concept, has provided an opportunity for community members to enhance their livelihood. This promotes environmentally friendly methods in the conservation and management of natural resources. A minimal percentage of respondents were members of CBAG in the fringe communities who play minimal roles in the management and decision-making process. The fringe communities derive benefits such as employment, materials for building, logistics, medicinal plants, high crop yields, rainfall, and NTFP viz. snails, sponges, wild mushrooms, etc. from the Abasumba GSBA. It is concluded that there is reasonable community participation through CBAG and fringe community

members in the co-management of the Abasumba, GSBA in Ghana. This indicates the significance of inclusive governance in natural resource management as participation fosters a sense of ownership among community members, which is vital for the sustainability of environmental initiatives. Research has shown that when local stakeholders are actively involved in the co-management of forest reserves, it enhances the effectiveness of management strategies and leads to better conservation outcomes. Furthermore, the engagement of fringe communities ensures that diverse perspectives are considered, which can reduce conflicts and promote equitable resource distribution. Nevertheless, challenges such as varying levels of engagement and potential power imbalances must be addressed to optimize participation. Generally, the importance of collaborative approaches will lead to the achievement of sustainable development goals and enhancing community resilience in the face of environmental change.

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